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Final Report

NOTES ON THE BIOLOGIES AND HABITS OF PINE ROOT APHIDS

by

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A study was conducted in eastern Tennessee between the years 1959 and 1962 to determine the role of insects in causing post-emergence chronic tipburn on white pine.[1/] [2/] [3/] Toole[4/] and Davison[5/] suspected that root aphids caused the blight of white pines in North Carolina. Consequently, in conjunction with work in eastern Tennessee, observations were made on the biologies and habits of pine root aphids. These observations were made at the Bent Creek Experimental Forest near Asheville, North Carolina, because root aphids found there appeared to be the same as those in Tennessee.

Root aphids were obtained from the roots of white pine growing in the Rocky Cove area. Collections of aphids were made primarily to obtain winged forms for identification. Alates were obtained by making occasional checks in the field and bringing infested roots of pine with the surrounding damp soil into the laboratory for aphid rearing, and also by digging roots and collecting the winged forms directly from them.[6/]

There appeared to be two species of root aphids on white pine in the Bent Creek area, a small one (approximate size 0.5 x 1.5 mm.) and a larger one (0.75 x 2.5 mm.). Apterous forms of all sizes of the small species could be found throughout the year, indicating that several generations of apterous aphids occur in the soil annually. Winged forms of the small species were obtained November 16 and 23, 1959, from infested roots brought into the laboratory. Subsequent checks in the field failed to reveal other winged aphids. The aphids were identified as belonging in the genus Prociphilus by Dr. C. F. Smith of North Carolina State College[7/]. Observations indicate that the small species

1/ Amman, Gene D. Exploratory study to determine if root aphids cause white pine blight. Southeast. Forest Expt. Sta. Prog. Rpt., 5 pp. 1960.

2/ Amman, Gene D. Exploratory study to determine whether aphids cause white pine blight in eastern Tennessee. Southeast. Forest Expt. Sta. Final Rpt., 4 pp. 1962.

3/ Amman, Gene D. and Berry, C. R. Insects not a cause of post-emergence chronic tipburn of white pine in eastern Tennessee. Southeast. Forest Expt. Sta. Res. Notes ____. (Submitted for publication.)

4/ Toole, E. Richard. White pine blight in the Southeast. Jour. Forestry 47:378-382. 1949.

5/ Davison, Alexander T. Root aphids of the genus Prociphilus on pines in the Duke Forest. (Unpublished master's thesis, Duke University, Durham, 17 pp.) 1950.

6/ See footnote 2.

7/ Smith, C. F. Personal letter to R. J. Kowal, Feb. 8, 1960.

of root aphid maintains a continuous population of apterous forms on the roots and produces a few winged forms in the fall of the year. Where the winged forms go is unknown, but it is suspected that their only host is white pine. No association with ants was observed for this aphid.

The smaller aphid species feeds on small roots and also appears to feed on mycorrhizae. It usually forms a nest of flocculent white wax on a group of mycorrhizae where the female gives birth to living young. The aphids may be found from an inch to several feet below the surface of the ground. Moisture seems to be very important as the aphids are seldom found where the soil is dry.

In the Bent Creek area the larger species of aphid on white pine roots was less common than the smaller one. This species was encountered only twice--October 1959 and November 1961. At these times the aphids had developed wings, and most had already flown. In both cases the insects were located only two to five inches below the surface of the ground. Abundant wax lined the burrow along the root where they were found. The entire colony developed wings; no apterous forms remained. No ants were found associated with this species at Bent Creek; however, Dr. Smith[8/] found ants associated with this insect and Davison[9/] reported Lasius interjectus Mayr tending root aphids on white pine. It is not known whether Davison was studying the small or large species of root aphid.

In October 1959 alate aphids of another species were recovered from the roots of pitch pine. These insects fed on small roots but were not found associated with mycorrhizae. The aphids were tended by an ant, L. alienus (Foerst.) = (L. alienus americanus Em.[10/]). The ants moved the apterous aphids when the digging of roots disturbed them.

Dr. Smith believes that the three species of aphids are new and that the one found on pitch pine is the same as one he collected on loblolly pine at Raleigh.[11/] The aphids have been sent to Dr. C. F. Smith for identification.

8/ Personal correspondence with Dr. C. F. Smith, Sept. 30, 1959.
9/ See footnote 5 on p. 1.
10/ Determined by M. R. Smith.
11/ Smith, C. F. Personal letter, January 6, 1960.